

REMARKS

At the outset, Applicants acknowledge the Examiner's withdrawal of the 35 U.S.C. § 102(e) rejection as anticipated by the Suzuki '945 patent.

Claims 69-88 are currently pending in the application. By this amendment, claims 49-68 have been cancelled without prejudice or disclaimer and claims 69 and 82 have been amended for the Examiner's consideration. Specifically, claims 69 and 82 have been amended to more clearly define the invention by deleting the term "species." Applicants respectfully submit that the above amendments do not add new matter to the application and are fully supported by the specification.

In view of the concurrently filed Rule 132 Declaration, the above amendments and the following Remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

35 U.S.C. §112 Rejection, First Paragraph

Claims 69 and 82 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly "failing to comply with the written description requirement." Office Action at page 2. Specifically, the Examiner alleges that the claims 69 and 82 "introduce the newly added limitation, "at least one polymer species" that does not have adequate support in the specification as originally presented." *Id.* at 3. This rejection is respectfully traversed.

Without acquiescing to the Examiner's rejection and in order to expedite prosecution of the application, Applicants' have amended claims 69 and 82 to delete the term "species." This amendment is made for the sole purpose of clarifying claims 69 and 82. This amendment is not made for the purpose of avoiding prior art or narrowing the claimed invention, and no change in claim scope is intended. Therefore, Applicants do not intend to relinquish any subject matter by these amendments.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 112, first paragraph rejection of claims 69 and 82.

35 U.S.C. § 103 Rejection

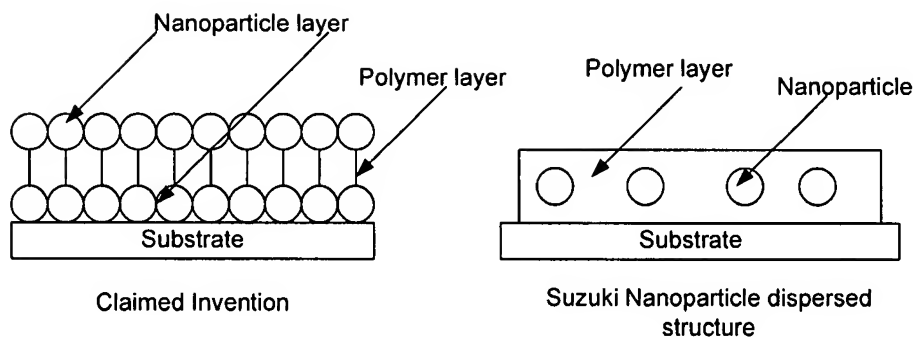
Claims 69-88 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U. S. Patent No. 6,592,945 issued to Suzuki ET AL. (the “Suzuki ‘945 patent”). This rejection is respectfully traversed for at least the following reasons.

To maintain a proper rejection under 35 U.S.C. § 103, the Examiner must meet three conditions. First, the Examiner must show that the prior art suggested to those of ordinary skill in the art that they should make the claimed composition or device or carry out the claimed process. Second, the Examiner must show that the prior art would have provided one of ordinary skill in the art with a reasonable expectation of success. Both the suggestion and the reasonable expectation of success must be adequately founded in the prior art and not in an Applicants’ disclosure. Third, the prior art must disclose or suggest all the claim limitations. *In re Vaeck*, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991).

The Suzuki ‘945 patent is cited for disclosing a method of “manufacturing a structure comprising forming a layer of a crosslinkable polymer on a substrate, depositing metal nanoparticles on the polymer film, repeating the process multiple times to form a laminate of multilayers of the polymer and the nanoparticles.” Office Action at page 3. The Examiner has failed to establish a *prima facie* case of obviousness because the reference fails to disclose or suggest each and every element of the claimed invention and because there is no motivation or suggestion to modify the prior art to carry out the claimed methodology. The prior art actually teaches away from the claimed invention.

First, independent claim 69 recites “treating the resin on the nanocomposite film to form an abrasion resistant matrix on the nanocomposite film.” Nowhere does the Suzuki ‘945 patent disclose or suggest an abrasion resistant matrix.

Next, in contrast to the claimed invention, which produces a nanocomposite film having alternating layers of a nanoparticle layer and a polymer layer, the Suzuki ‘945 patent discloses a nanoparticle dispersed structure—that is, in each layer, “the nanoparticles are dispersed [in] and held in a crosslinked polymer material.” *See* Suzuki ‘945 patent at column 2, lines 53-55. The figure immediately below schematically demonstrates the structural differences between the nanocomposite film produced by the claimed invention and the Suzuki nanoparticle dispersed structure.



Moreover, unlike the claimed invention, Suzuki discloses that a multilayer structure where each layer consists of nanoparticles dispersed within a polymer:

[A] laminate of a nanoparticle dispersed structure can be manufactured by forming a film (second layer) composed of a nanoparticle dispersed structure over a film (first layer) composed of a previously formed nanoparticle dispersed structure. Further layers can be added by repeating this operation. *Id.* at column 4, lines 31-37.

Thus, since each layer is composed of nanoparticles dispersed within a polymer, the Suzuki '945 patent does not disclose or suggest a nanocomposite film having alternating layers of nanoparticle layers and polymer layers as recited by independent claim 69.

Next, the claimed methodology is directed to immersion to form the nanoparticle layers. Nowhere does the Suzuki '945 patent disclose or suggest immersion as a means to deposit the nanoparticles. The Examiner, however, alleges that "it would have been obvious to one of ordinary skill in the art to employ immersion to deposit the metal particles because that [sic] these deposition methods have been conventionally used as a substitute for one another." Office Action at page 3.

First, the Examiner's conclusory statement is not proper and cannot adequately support a *prima facie* case of obviousness because it relies upon personal knowledge. The Examiner cannot simply reach conclusions based upon her own understanding or experience—or on her personal assessment of what would be basic knowledge or common sense. The Examiner must

point to some concrete evidence in the record to support her assertion. According to MPEP at § 2144.03(A) and *In re Zurko*, 258 F.3d 1379, 1385:

it is never appropriate to rely on “common knowledge” in the art without evidentiary support in the record, as the principle evidence upon which a rejection is based.

Moreover, if the Examiner is relying upon personal knowledge to support the finding of what is known in the art, i.e., “the deposition methods have been conventionally used as a substitute for one another,” the Applicants’ invite the Examiner to provide an affidavit or declaration setting forth specific factual statements and explanation to support the findings.

Secondly, even if the Examiner’s conclusory statement were proper, it still does not adequately support a *prima facie* case of obviousness because the proposed modification to substitute immersion in place of sputter coating for deposition of the nanoparticles would render the Suzuki ‘945 patent unsatisfactory for its intended purpose as discussed in the Declaration Under 37 C.F.R. § 1.132 (the “Claus Declaration”) filed concurrently herewith.

In the Claus Declaration, Dr. Claus states that it would not be obvious to employ immersion as a substitute for sputter coating for nanoparticle deposition in the Suzuki method. Referring to the Claus Declaration, Dr. Claus states at ¶ 9 of his Declaration that the Suzuki ‘945 discloses that the nanoparticles are deposited as a discontinuous layer having grain boundaries between the nanoparticles and not as a continuous layer lacking grain boundaries between the nanoparticles. *See* Suzuki ‘945 patent at column 3, lines 57-61 and column 4, lines 19-20. Moreover, Dr. Claus states that the Suzuki further teaches away from forming a continuous layer of nanoparticles by specifically stating “[T]he nanoparticle layer must not be so thick that the nanoparticles form this continuous layer and the grain boundaries disappear.” *See Id.*, at column 4, lines 14-20.

Dr. Claus states that contrary to the Examiner’s statement, immersion cannot be employed as a substitute for vacuum vapor deposition, sputter coating, CVD, or MOCVD to deposit the nanoparticles on the resin. Claus Declaration at ¶ 10. Further, Dr. Claus states that if immersion were substituted for one of these methods for nanoparticle deposition, a continuous layer of nanoparticles having no grain boundaries between the nanoparticles would be generated, which the Suzuki ‘945 patent specifically teaches away from producing. *Id.* Accordingly, the Suzuki method would be unsatisfactory for its intended purpose if immersion were employed for

nanoparticle deposition because immersion would result in the formation of a continuous layer of nanoparticles, which the Suzuki '945 patent teaches away from producing. Additionally, formation of a continuous layer of nanoparticles would compromise the structure of the resultant nanoparticle dispersed material and function of the material. *Id.* Thus, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *See* MPEP § 2143.01(V).

Accordingly, the proposed modification would destroy the basic operability of the Suzuki '945 patent. In these circumstances, there can be no suggestion, teaching or motivation to modify the Suzuki '945 patent. Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 69-88. Since none of the other prior art of record, whether taken alone or in combination, discloses or suggests all the features in independent claim 69, Applicants respectfully submit that claim 69 and all the claims that depend therefrom, are allowable.

35 U.S.C. § 103 Rejection

Claims 69-88 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U. S. Patent No. 6,624,886 issued to Natan ET AL., ("Natan '886"), U. S. Patent No. 6,242,264 issued to Natan ET AL., ("Natan '264") or U. S. Patent No. 6,025,202 issued to Natan ("Natan '202") in view of U.S. published Patent Application 2004/02315997 issued to Meisenburg ET AL., ("Meisenburg") or the Suzuki '945 reference. Applicants respectfully traverse this rejection for at least the following reasons.

The Natan references (i.e., Natan '886, Natan '264 and Natan '202) are cited for disclosing a method for making a film of gold nanoparticles "by forming a monolayer of Au nanoparticles on a glass substrate coated with APRMS or MPTMS; immersing the monolayer in a crosslinker, 2-mercaptoethylamine." (Office Action at page 4.) The claims distinguish over the Natan references for several reasons. First, the Natan references disclose the use of monomers, such as 2-mercaptoethylamine. Nowhere do the Natan references disclose or suggest the use of polymers to form a polymer layer as now clearly recited in claim 69. Secondly, nowhere do the Natan references disclose or suggest forming an abrasion resistant layer as required in claim 69.

Moreover, the Natan references teach away from the claimed invention and the proposed combination does not produce a *prima facie* case of obviousness. The Examiner recognizes that the Natan references do not disclose forming an abrasion resistant layer (Office Action at page 5), and attempts to rely upon the secondary references of Meisenburg and Suzuki to supply the missing claimed limitations relating to the abrasion resistant matrix.

As discussed in the Claus Declaration at ¶ 14, Dr. Claus states that the Natan references are directed to producing a surface-enhanced Raman spectroscopy (SERS)-active surface. The Natan references disclose that the SERS-active surfaces are glass substrates coated with either silver or gold nanoparticles, which provide an increase in the observed Raman scattering by many orders of magnitude. Claus Declaration at ¶ 14. The nanoparticles coated on the substrate surface are capable binding to an analyte of interest. *Id.* Furthermore, Dr. Claus states that upon binding of the analyte, the characteristic SERS spectrum of the nanoparticle-coated surface is changed in such a way that the presence of the analyte molecule is indicated and the analyte can be quantitated. *Id.*

Additionally, in the Claus Declaration at ¶ 15, Dr. Claus states that if an abrasion resistant coating is formed on the SERS-active surface, the nanoparticles would be inaccessible to the analyte. More specifically, the resin coating would preclude the analyte from binding to the nanoparticles and prevent any SERS quantization of the analyte of interest. *Id.* Accordingly, the combination of the Natan references in view of the Meisenburg publication or the Suzuki '945 patent proposed by the Examiner would rendered the Natan references unsatisfactory for their intended purpose if a coating were formed on the Natan SERS-active surfaces because the resin coating would prevent analyte binding to the nanoparticles and all sensing capabilities of the SERS-active surface would be destroyed. (See MPEP § 2143.01(V) ("if the modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification") and MPEP § 2143.01(VI) ("if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teaching of the references are not sufficient to render the claims *prima facie* obvious."))

Accordingly, the Examiner's proposed combination would destroy the basic functional operability of the primary references. In these circumstances, it is clear that there can be no

suggestion, teaching or motivation to combine the teachings of the Natan references with the teachings of the Miesenberg reference or the Suzuki '945 reference. Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 69-88. Since none of the other prior art of record, whether taken alone or in any combination, discloses or suggests all the features in independent claim 69, Applicants respectfully submit that claim 69, and all the claims that depend therefrom, are allowable.

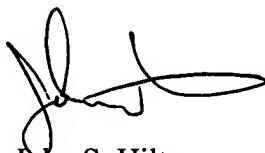
CONCLUSIONS

Applicants submit that a full and complete response has been made to the pending Office Action and respectfully submit that all of the stated grounds for rejection have been overcome or rendered moot. Accordingly, Applicants respectfully submit that all pending claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is thus respectfully requested to pass the above application to issue.

Should the Examiner feel that there are any issues outstanding after consideration of this Amendment, the Examiner is invited to contact the Applicants' undersigned representative at the number below to expedite prosecution. Prompt and favorable consideration of this Reply/Amendment is respectfully requested. Applicants respectfully request that a timely Notice of Allowance be issued for this application.

Applicants believe that a One-Month extension of time is required at this time and is attached herewith. If further extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. §1.136(a), and any fees required therefor (including fees for net addition of claims) are hereby authorized to be charged to **Deposit Account No. 23-1951** (McGuireWoods). Please charge any deficiencies in fees and credit any overpayment of fees to the same Deposit Account.

Respectfully Submitted,



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